

**PRESENTATION TO THE
NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**STATUS OF THE CIVILIAN RADIOACTIVE WASTE
MANAGEMENT PROGRAM**

BY

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U.S. DEPARTMENT OF ENERGY

JUNE 29, 1999

Chairman Cohon and Members of the Board:

Thank you for the opportunity to provide my perspective on the status of the Civilian Radioactive Waste Management Program. Today, I would like to update the Board on recent developments related to the waste management program since I spoke to you last January and provide my thoughts regarding the design evolution process. I also want to briefly address the two recent reports from the Board. Later today, our Federal and contractor team will present details of our design evolution process, as you have requested, and other recent progress on the Yucca Mountain Project.

Program Budget

The Administration submitted a Fiscal Year 2000 budget request of \$409 million for the program. The Energy and Water Development Appropriations Act passed by the Senate on June 16 includes \$355 million for nuclear waste disposal, \$54 million less than our request. The \$355 million includes \$4.7 million for scientific oversight by the State of Nevada and \$5.4 million for affected units of local government, as well as \$3 million to conduct seismic excitation experiments at the University of Nevada at Reno's Earthquake Engineering Facility. The House has not yet started to mark-up our appropriation.

Our Fiscal Year 2000 budget request supported the funding levels identified in the viability assessment. The Department is currently reevaluating activities, taking into account advances in the reference repository and waste package designs and a potential enacted budget for Fiscal Year 2000 that is substantially lower than requested. The Board has expressed concern about the impacts of budget cutbacks in completing the planned science and engineering activities. We very much share that concern. We are prioritizing the activities most important for developing the information needed to support a Secretarial decision on whether to recommend the site to the President. We will emphasize those science and engineering activities that most effectively reduce the level of uncertainty in the performance of the repository. Building on the momentum achieved in the last four years, our objective remains to develop the documentation to determine if the Yucca Mountain site is suitable to support a Secretarial decision on site recommendation in 2001 and, if the site is recommended, a license application in 2002. However, it is probable that if the budget reductions are significant, our current program milestones will have to be adjusted.

Legislation

Comprehensive bills on the management of spent fuel and high-level wastes have been introduced in both houses of Congress this session. H.R. 45 was approved by the House Commerce Committee in April and awaits further action. The Senate Energy and Natural Resources Committee approved a Senate bill, S. 608, on June 16. Both bills would allow implementation of Secretary Richardson's proposal to take title to spent nuclear fuel at commercial sites. Under this proposal, the spent fuel would remain on-site, but the Department would assume responsibility for the fuel. The Secretary's proposal could be implemented in several different ways depending upon individual circumstances at each utility, such as a utility's current operating status, availability of on-site dry storage, and financial needs.

In many respects, the Senate bill is substantially different from the previous comprehensive bills in that it would amend, rather than replace, the Nuclear Waste Policy Act of 1982, as amended. The bill would provide for acceptance of spent fuel at the repository surface facilities after the Nuclear Regulatory Commission (NRC) issues a construction authorization. The bill sets a milestone of December 31, 2006, for NRC to decide whether to issue the construction authorization. The bill would repeal Section 801 of the Energy Policy Act of 1992 and vacate the Environmental Protection Agency's (EPA) authority to set radiation protection standards for the Yucca Mountain site. Instead, the bill would give this authority, along with specific guidance, to NRC. Additionally, the Senate bill would establish an Office of Nuclear Spent Fuel Research within the Department's Office of Nuclear Energy, Science, and Technology. This new office would study treatment, recycling, and disposal of spent fuel, specifically reprocessing and transmutation.

Board Reports

We are in the process of preparing detailed responses to the two reports to Congress and the Secretary of Energy that the Board issued in April, one on the viability assessment and one on the Board's 1998 activities. I would like to briefly address these reports.

We appreciate your recognition of the importance of our successful and timely completion of the viability assessment. We agree that the viability assessment was a useful management tool for integrating our work and setting priorities. We also agree that the viability assessment is not the same as a suitability evaluation; in fact, the viability assessment identified the additional work to evaluate suitability and prepare a license application for the viability assessment reference design. We are pleased that the Board found that the testing and research plans in the viability assessment are generally consistent with those identified by the Board.

The viability assessment was more than just a preliminary assessment of the Yucca Mountain site. It demonstrated our ability to coherently assemble scientific information collected over a 15-year period. It also demonstrated our ability to use that scientific information to produce a design that would be feasible, both technically and economically. Finally, it demonstrated our ability to evaluate the performance of a particular design with a reasonable degree of confidence.

The Board emphasized the need to evaluate alternatives to the viability assessment

reference design. Now that we have fulfilled our obligation to issue the viability assessment, we are using what we learned to guide the evolutionary design development process as we select next generation design concepts that will be used for evaluating the suitability of the site and then preparing a license application. The design concepts we are developing seek to balance the programmatic considerations of repository performance, demonstrability, cost, and schedule, as well as the broader policy issues, such as flexibility for future generations with regard to the time of repository closure.

Selecting a time range for closure involves both technical and institutional issues related to repository performance, extended ventilation, monitoring, economics, and projections of societal conditions. We believe that *a priori* specification of a particular time of closure at this stage of the program is not appropriate. Additionally, if the repository design required a preclosure period of several hundred years, licensing could be complicated by necessitating demonstration of societal stability for such long times. The intent of our design efforts is to develop a concept that affords future generations the flexibility to choose how long a monitoring period is appropriate, ranging from shortly after completion of loading to several hundred years in the future.

This flexibility affords future generations the choice of closing the repository in the most beneficial manner, balancing the technical and institutional situation at that time. Our design criteria will enable future generations to close the repository promptly after loading, while still protecting public health and safety and the environment, or allow safe extension of the period of monitoring of the facility.

Your reports and other recent correspondence emphasized the importance of reducing uncertainties in repository performance and highlighted the merits of a lower temperature design in reducing the significance of these uncertainties. We recognize that the consideration of uncertainties is central in any evaluation of repository performance. We also recognize that repository temperatures significantly influence these uncertainties. The viability assessment helped us to better identify the most relevant uncertainties. Our design evolution process considers these uncertainties and the potential to mitigate them with various design approaches.

Design Evolution

Last January we discussed with the Board the initial phase of an evaluation of design alternatives that our Management and Operating contractor (M&O) had begun. The goal of this evaluation was to develop and evaluate a diverse range of conceptual repository designs that work well in concert with the Yucca Mountain site and to recommend a next generation of the design evolution. The Board has long advocated the comprehensive investigation of alternative waste package and repository designs. The timing of the evaluation allowed us to take full advantage of the knowledge gained in producing the viability assessment. One relevant criterion in the evaluation was how well various design concepts could reduce uncertainty.

This evaluation consisted of two phases. In phase one, the designers went well beyond the bounds of the viability assessment reference design and analyzed a broad series of design concepts and features for their potential value as elements of a repository design. Using this

information, a set of enhanced design alternatives was created. In phase two, these enhanced design alternatives were refined and evaluated against a set of criteria addressing four broad aspects of the repository. These four aspects were safety assurance demonstrability; flexibility to accommodate design changes; construction, operations and maintenance issues; and cost and schedule factors. Based on a qualitative comparison of the alternatives, which will be discussed in greater detail in later presentations, the M&O recommended a design concept for this phase of the design evolution.

The recommended repository concept can be characterized as a lower thermal loading design, although it was not the coolest design considered. This design uses more extensive thermal management techniques than the viability assessment reference design. These thermal management techniques include thermal blending of fuel assemblies, closer spacing of the waste packages, wider spacing of the emplacement drifts, and preclosure ventilation. The recommended design differs from the viability assessment reference design in a number of other aspects. While both use a two-layer waste package, the recommended design places the corrosion-resistant material on the outside, rather than on the inside, to provide long-term protection to the more corrosion-susceptible structural material. This is consistent with the concept that the Board suggested we consider. The recommended design also adds more defense-in-depth with a titanium drip shield covered by backfill to protect the waste packages from possible dripping water while they are still hot enough to be susceptible to localized corrosion. Finally, the recommended design concept uses steel structural materials in the drifts instead of concrete. This change helps to avoid the possible impacts of the concrete on mobilization and movement of radionuclides.

The evaluation of the next-phase recommended design concept against all of the criteria will be discussed in more detailed presentations later today. I would like to emphasize the operational flexibility offered by this design concept. The recommended design concept allows further modifications toward either higher temperature or lower temperature conditions in the future. This flexibility will allow the scientific and engineering data gathered by the program throughout site characterization, licensing, construction, operation, and monitoring periods to influence the repository design or operation, as warranted. For example, a move toward cooler temperature profile goals could be a matter of changing to an operating mode that includes a longer period or higher rate of preclosure ventilation. Conversely, higher temperatures could also be achieved if new information deemed that change desirable. I agree with the Board that this evaluation process needs to be well founded, well documented, and transparent. It is important for the program and interested parties to develop a common understanding of the design evolution process for the reference repository design concept for Yucca Mountain. The Department will consider the Board's input before we take final actions on the M&O's design recommendation for the next phase. In the interim, we have begun to use the lower thermal load design concept, instead of the viability assessment reference design, for activities that are affected by this design characteristic.

The design concept will continue to evolve as the program progresses and design aspects are optimized. Design evolution always has both technical and programmatic considerations. An example of a refinement is that we are now planning to add photovoltaic solar power panels to provide some of the electricity for preclosure ventilation fan motors. Design considerations,

such as those for appropriate long-term power supplies, are important to better align the program with the broader societal and technological objectives for the national and global environment.

Regulatory Revisions

Both EPA and NRC have been developing regulations for geologic disposal that are specific to Yucca Mountain, in accordance with the Energy Policy Act of 1992. NRC issued its proposed rule, 10 CFR Part 63, for public comment on February 19, 1999. The Department strongly endorses NRC's use of risk-informed, performance-based licensing criteria for implementing a radiological protection standard. This approach places emphasis on requirements that give the highest attention to the issues of most importance to the protection of public health and safety. The elimination of numerical subsystem performance objectives and siting criteria found in the generic regulations at 10 CFR Part 60 in favor of overall performance objectives allows both the Department as applicant, and NRC as regulator, to place emphasis on the key technical issues related to protection of public health and safety.

EPA's draft site-specific rule is in the Administration's review process, prior to EPA's publication as a proposed rule for public comment. As it should be, the Department is involved in this process, providing technical and scientific information. It would not be appropriate, however, for me to comment on the content of EPA's draft rule at this time. I can say that the interagency discussions are leading to clarifications of specific provisions in the rule. The Department's primary concern has been that the technical aspects of the rule should not only protect public health and safety and the environment, but also be a fair test of the safety of a repository that is demonstrable in a rigorous licensing proceeding.

Near-term Milestones

With completion of the viability assessment, the program is now focused on completion of site characterization. We plan to publish a Yucca Mountain draft environmental impact statement (EIS) for public comment this summer. This comprehensive document has been prepared pursuant to the Nuclear Waste Policy Act of 1982, as amended. The draft EIS systematically analyzes the potential impacts from construction, operation and monitoring, and closure of a repository under a range of implementing alternatives, as we described to the Board last summer. The draft EIS also provides information on the potential environmental impacts from an alternative referred to as the "no action alternative", under which there would be no development of a repository at Yucca Mountain.

Preparation of the draft EIS has been a major effort by the Department and its contractor team. Despite many obstacles, its completion will further affirm that the program remains focused on the achievement of key milestones leading to the completion of site characterization. Following 13 public hearings and consideration of comments, we are scheduled to publish a final EIS in 2000.

The program is now working to complete the technical documentation necessary to determine whether the site is suitable for a Secretarial decision on site recommendation. We will refine the repository safety strategy to reflect the design evolution. We are continuing to gather

and analyze relevant data, some of which you will hear about tomorrow. We will complete descriptions of the detailed process models that describe system performance and the abstraction of these models that are used in performance assessment, and we will generate another major iteration of total system performance assessment. Using this information, we will prepare a comprehensive package for public review and comment describing the scientific and technical aspects of a monitored geologic repository at Yucca Mountain, prior to any determination of site suitability and decision on site recommendation. We then will refine the process models and the total system performance assessment as a basis for decisionmaking. Input from the Board will be very important as we proceed along this path.

Conclusion

The program's work is now focused on the activities most important for developing the information needed to determine if the site is suitable and, if suitable, to support a Secretarial decision on whether to recommend the site to the President. The viability assessment clarified the remaining work and illuminated those technical issues that should be further addressed. We have started this remaining work and have commenced assembling the information to support a decision for the Nation on geologic disposal at Yucca Mountain.

Before I close, I would like to make an important announcement about our M&O contract. We are approaching the end of the 10-year contract with TRW, which started in 1991 and expires in February 2001. Although there is never a good time to recompute a complex project such as this one, we have decided, consistent with Departmental policy and Congressional appropriation intent, to recompute the M&O contract on schedule. We are looking at the activities and products that must be conducted and produced beyond 2001 and will use this recompetition as an opportunity to adjust the contracting strategy to best achieve those milestones.

Thank you for the opportunity to share my thoughts with you today and I will be happy to answer any questions.